

CLAIMS

What is claimed is:

1. A metering device for use with a power-operated injection system for dynamically measuring an amount of fluid that is injected into a plant.
- 5 2. The metering device of Claim 1, wherein the metering device limits a total amount of fluid that is injected into one or more injection sites of the plant.
3. The metering device of Claim 1, wherein the metering device includes a plunger having a graduated pull rod.
4. The metering device of Claim 1, wherein the metering device is externally
10 powered and/or pump-actuated.
5. The metering device of Claim 1, wherein the metering device manually, mechanically, and/or electronically indicates the total amount of fluid injected into the plant.
6. The metering device of Claim 1, wherein the metering device includes a
15 chamber for containing the fluid, the chamber being separate from a fluid reservoir containing a supply of the fluid.
7. The metering device of Claim 1, wherein the metering device employs a spring, a pump, applied pressure, and/or vacuum.
8. The metering device of Claim 1, wherein the metering device includes a
20 totalizer.

9. A power-operated fluid injection system for injecting injection fluid into a plant, comprising:
- an injection device adapted to be coupled to a fluid under pressure for assisting in the injection of the injection fluid into the plant; and
- 5 a metering device for dynamically measuring an amount of injection fluid that is injected into the plant.
10. The injection system of Claim 9, further comprising a pressure release valve that allows fluid to return to the metering device when pressure within a pressurized reservoir within the plant exceeds a predetermined pressure.
- 10 11. The injection system of Claim 9, further comprising a pressure gauge that measures an injection pressure within the plant.
12. The injection system of Claim 9, further comprising an injection needle couplable to the injection device by a tube.
13. A method for injecting a fluid into a plant with a power-operated injection
15 system, comprising dynamically measuring, with a metering device, an amount of fluid that is injected into a plant.
14. A method for injecting a fluid into a plant comprising:
- providing a bore in the plant;
- inserting a plug into the bore; and
- 20 injecting the fluid through a membrane of the plug to provide a pressurized reservoir within the plant for injecting the fluid into the plant.
15. The method of Claim 14, further comprising automatically preventing overpressurization of the pressurized reservoir.

16. The method of Claim 14, further comprising dynamically measuring an amount of fluid that has been injected into the plant.
17. A plug for use in the injection of a fluid into a plant, the plug comprising a body having a membrane disposed therein through which a needle is passed to inject
5 the fluid into the plant, the plug being positionable in a bore of the plant to help provide a pressurized reservoir in the plant.
18. The plug according to Claim 17, wherein the body is shaped to be permanently inserted into the bore of the plant.
19. The plug according to Claim 17, further comprising a barb for securing the plug
10 in the bore of the plant and a barb for sealing the fluid in the bore of the plant.
20. A system for injecting a fluid into a plant, comprising:
 - an injection device couplable to a fluid under pressure for assisting in the injection of the fluid into the plant, the injection device also couplable to a reservoir of the fluid to be injected into the plant;
 - 15 a needle attachable to the injection device for allowing the fluid to be injected to pass therethrough; and
 - a plug configured to be permanently inserted into a bore of the plant, the plug including a membrane through which the needle passes, for providing a pressurized reservoir of the fluid in the plant.
- 20 21. The system of Claim 20, further comprising a drill bit shaped to form at least a portion of the reservoir boundary in the plant and countersink the bore.
22. A plug for use in the injection of fluid into a plant comprising a body having a bore therethrough, a membrane positionable within at least a portion of the bore,

and an insertable member positionable within at least a portion of the bore for maintaining the membrane within the at least a portion of the bore.

23. The plug of Claim 22, wherein the body includes at least one outwardly extending ridge.
- 5 24. A pressure gauge that measures an injection pressure within a plant, a falling injection pressure measured by the pressure gauge indicating that a fluid is being injected into the plant.
25. The pressure gauge of Claim 24, wherein the injection pressure within the plant is a pressure within a reservoir of the fluid within the plant.
- 10 26. An apparatus for injecting a fluid into a plant, the apparatus comprising:
 - (a) a fluid reservoir containing the fluid;
 - (b) a gas reservoir containing a gas;
 - (c) a needle for injecting the fluid into the plant;
 - (d) an injection device couplable to the fluid reservoir, the gas reservoir, and
15 the needle, the injection device using the gas to inject the fluid through the needle and into the plant; and
 - (e) a pressure gauge that dynamically indicates that fluid is being injected into the plant.
- 20 27. A hand-operated apparatus for injecting fluid into a plant, comprising:
 - (a) a fluid reservoir containing the fluid;
 - (b) a needle for injecting the fluid into the plant; and
 - (c) an injection device couplable to the fluid reservoir and the needle, the injection device including a handle that, when manually depressed by the operator, causes injection of the fluid into the plant.

28. The hand-operated apparatus of Claim 27, further comprising a pressure release valve for preventing overpressurization in a pressurized reservoir within the plant.
29. The hand-operated apparatus of Claim 27, further comprising a metering device that dynamically measures an amount of fluid that is injected into the plant.
- 5 30. A battery-powered apparatus for injecting fluid into a plant, comprising:
 - (a) a fluid reservoir containing the fluid;
 - (b) a needle for injecting the fluid into the plant;
 - (c) an injection device couplable to the fluid reservoir and the needle; and
 - (d) an injection device powered by a battery connectable thereto to inject the
- 10 fluid into the plant.
31. The battery-powered apparatus of Claim 30, further comprising a pressure relief valve for preventing overpressurization in a pressurized reservoir within the plant.
32. The battery-powered apparatus of Claim 30, further comprising a metering device that dynamically measures an amount of fluid that is injected into the plant.
- 15 33. The battery-powered apparatus of Claim 30, further comprising a pressure gauge that measures an injection pressure within the plant, a falling pressure indicating that the fluid is being injected into the plant.
34. A pressure release valve for use with an apparatus for injecting a fluid into a plant.
35. The pressure release valve of Claim 34, wherein the apparatus includes a hand-
- 20 held plant injection device.

36. The pressure release valve of Claim 34, wherein the pressure relief valve is adjustable to control a maximum pressure of the fluid in the plant.
37. An apparatus for injecting a fluid into a plant, comprising:
- (a) a fluid reservoir containing the fluid;
 - 5 (b) a needle for injecting the fluid into the plant;
 - (c) an injection device couplable to the fluid reservoir and the needle, the injection device injecting the fluid through the needle and into a pressurized reservoir within the plant; and
 - 10 (d) a pressure release valve for preventing overpressurization within the pressurized reservoir.
38. The apparatus of Claim 37, further comprising a metering device for dynamically measuring an amount of fluid that is injected into the plant.
39. The apparatus of Claim 38, wherein the pressure release valve allows fluid in the pressurized reservoir to return to the metering device.
- 15 40. An injection needle assembly including a quick-connect coupler for attaching the injection needle assembly to an injection device for injecting fluid into a plant.
41. The assembly of Claim 40, further comprising a handle for inserting and removing a needle of the assembly into/from the plant.
- 20 42. The assembly of Claim 40, wherein the assembly includes an injection needle, the needle including a slot at a distal end thereof.